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ASBESTOS SAMPLING PROCEDURES

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Ministry
of the
Environment

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The Honourable
George A. Kerr, Q.C.,
Minister

K.H. Sharpe,
Deputy Minister

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ASBESTOS SAMPLING PROCEDURES

by

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17751

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Introduction

Asbestos analysis is a costly* and time consuming procedure and hence a sampling method that fixes all possible variables is essential. A standard method tested and used by the Ministry of the Environment is outlined below. This method is specific for water treatment plants and potable water distribution systems but can easily be adapted for environmental sampling.

The important part that the personnel in the field plays in the collection of the asbestos sample can not be strongly enough emphasized. Asbestos has many commercial uses such that the presence of asbestos products is almost universal. Hence, the chance of contamination of a sample at the time of sampling is very high. Great care is taken once the sample arrives at the laboratory but this can all be negated by a very minor error in field sampling.

The final data obtained is only as good as the collection procedure used.

Container Type

- samples for asbestos analysis should be collected in new 1 litre plastic containers with all plastic lids with no paper or metal paper inserts. Sample bottles should not be reused for asbestos samples.

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* The current commercial cost of having one asbestos analysis carried out is approximately $250.00 per sample and hence utmost care must be taken when sampling for asbestos to insure accuracy.

The recommended container is a narrow mouth polyethylene 1000 ml bottle with a polypropelene screw closure similar to Nalgene # 2003-0032. These bottles are available from the M.O.E. stores (Stores # 70-B-26). Prior to the packaging, these bottles, (70-B-26) must go through a quality control process in which random bottles are picked from the shipment and filled with double distilled-filtered water, shaken and examined for asbestos content. If significant asbestos is detected, the lot will be sampled further and possibly rejected.

Due to the high costs of quality control involved, the use of these bottles (70-B-26) should be restricted to asbestos sampling.

The wide mouth 1000 ml linear polyeythelene bottle used extensively throughout this Ministry (MOE stores Pack #9) may be substituted in emergency situations but are not ideal due to the wide mouth and lack of quality control. When these bottles are used, it should be noted on the field sheet.

The laboratory will mark an "X" on the bottom of asbestos sample bottles when they are returned to the stores for recycling and hence, a bottle with an "X" on the bottom should not be reused for asbestos analysis although it is suitable for other chemical use after washing.

Sample Volume

The following sample volumes are required for each asbestos analysis;

1 - 1000 ml bottle for asbestos analysis,

1 - 1000 ml bottle for chemical analysis.

Preservation of Samples

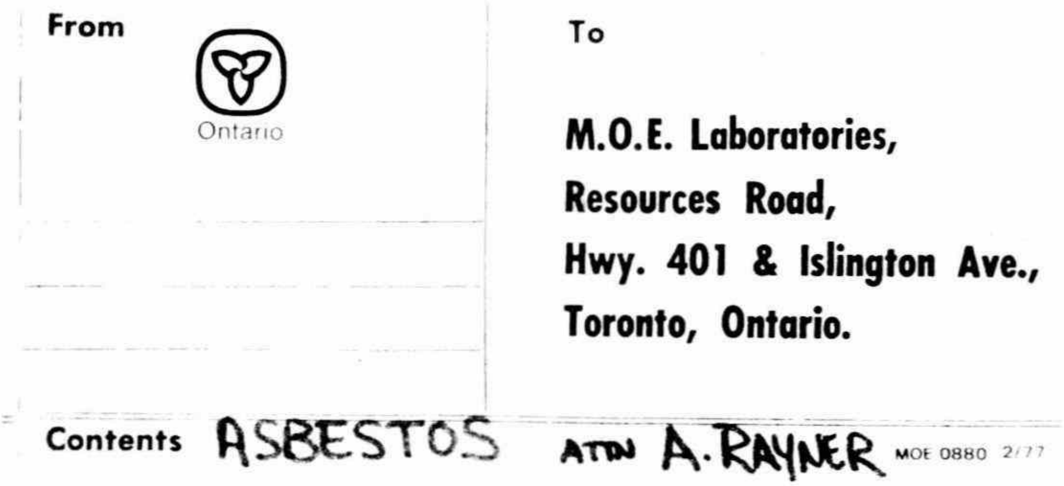
As the effects of storage on asbestos samples are still somewhat nebulous it is recommended that the sample be returned to the laboratory not more than 48 hours after the sample has been taken.

If this is not possible, the person sampling should contact the laboratory (416 248-7102) and request specially prepared mercuric chloride that has been checked for asbestos content in order to preserve the sample. It is anticipated that preservation in the field will rarely ever be required.

Samples should be protected against freezing and extreme heat. The 70-B-26 bottle pack recommended is insulated. Chemical samples should receive no preservation under any circumstances.

Shipping and Laboratory Handling

Samples sent in for analysis must be clearly marked as such and directed to the attention of A. Rayner, Physical Methods Section. A sample label is shown below.



From

Ontario

To

M.O.E. Laboratories,
Resources Road,
Hwy. 401 & Islington Ave.,
Toronto, Ontario.

Contents ASBESTOS ATTN A. RAYNER MOE 0880 2/77

Due to the nature of the sample and the recommendation that the sample be returned to the laboratory within 48 hours, it is recommended that a courier service or some other form of rapid shipment be used to ship the samples from remote locations to the Toronto laboratory. Every effort should be made to obtain a type of transport that will deliver the samples directly to the laboratory. In cases where it is found necessary to use facilities such as Air Express, the laboratory (416 248-7102) should be notified when the samples are shipped giving all pertinent information (ie. carrier, flight No., time of arrival, senders name, etc).

The laboratory receiving staff will deliver the unopened cartons directly to the Physical Methods Section as quickly as possible after their arrival. Here the samples will be separated into chemical and asbestos samples and taken to the appropriate laboratories. A copy of the submission sheets will be forwarded to the Asbestos Data Bank (see pg. 5).

Samples should be collected so as to arrive at the laboratory before 12:00 noon on Fridays thus avoiding overtime on weekends in order to filter the samples. If this is in the rare instance not possible, the laboratory should be notified by telephone (416 248-7102) as to the arrival time of the samples.

ASBESTOS DATA BANK

The Water Technology Section has maintained an "Asbestos Data Bank" on all potable water related asbestos samplings within the Province since asbestos was first detected in the early 1970's. It is proposed to maintain this "Bank" for ready reference for both research needs and day to day use by Ministry personnel. With most physical and chemical parameters used in the water related disiplines it is generally quite simple to retest if recent historical data is not available. The high cost, long turnaround time and limited laboratory capacity involved in asbestos analysis makes this impractical and hence it is important to have a ready reference source available.

It is proposed to set up data banks on a regional basis that will be updated every six months and sent to the regions for their reference.

Information on or contained in the "Asbestos Data Bank" may be obtained by telephoning (416 248-3935).

R.B. Hunsinger
Water Technology Section
Ontario Ministry of the Environment
Box 213, Rexdale, Ontario.

The laboratory will send a copy of the Asbestos Field Data Sheet to the Asbestos Data Bank c/o Water Technology Section when the sample is received at the laboratory. The completed chemical analysis will be sent directly to the Asbestos Data Bank by the laboratory. When the completed asbestos analysis is received this will be recorded in the "Data Bank".

Sampling Methods

In sampling for asbestos, two types of sampling will be encounted, tap sampling and collection with a "sampler".

Tap Sampling

Prior to sampling at a tap all attached devices must be removed from the tap faucet (ie. aerators, hoses etc.). The tap must be allowed to run at high volume for approximately 5 minutes prior to sampling in order to clear the system of any stagnant water. At the commencement of sampling reduce the flow to avoid splashing. Remove the cap of the bottle and rinse both the cap and the bottle at least 3 times with the water to be sampled. Fill the bottle or portion thereof always leaving 1" of air space at the top of the bottle to permit mixing at the laboratory. While sampling the cap of the bottle must be held in a downward position to avoid dust. Under no circumstances should the cap be put down or the inside of the cap or bottle be touched. If this happens, the sample bottle must be marked with an "X" on the bottom and the sampling started again with a fresh bottle.

Sampling with a "Sampler"

This method will be necessary in water plant wet wells and also in sampling source supplies (ie. lakes or rivers). The method used will be identical except that in some cases a depth sample will be required while in others composite samples through the water column will be required. These two types are described below.

The 'sampler' recommended is simply a "can sampler" which is simply a weighted cylinder into which a new narrow mouth polyeythelene bottle is fitted and the cap then removed and the"sampler"dropped through the required depth 6 times. The first 3 times the water is used to rinse the bottle in the"sampler" and its cap and the second set of three samples is used to rinse the container into which the sample is going to be decanted. After all have been rinsed 3 times, the sample is taken and a portion decanted into the sample bottles. Care must be taken not to handle the inside of the caps or bottles and to hold the caps downward during the sampling. The caps should not be put down at any time. If any errors in sampling occur, the sampling must be started again and the discarded bottles marked with an "X" on the bottom.

Normally, the sample bottle will be filled with 4 - ¼ bottle portions at ½ hour time intervals. Between sampling both the sample bottles and the bottle in the sampler must be capped. The"sampler" should be rinsed thoroughly in tap water after each use, dried and stored in a dust proof plastic bag for transportation.

A new plastic bottle must be placed in the sampler at each new location.

In taking a "composite" sample (ie. in a wet well) the "sampler" should be drawn up and down through the water column until full, avoiding the top and bottom 1 metre.

In taking a "depth" sample (ie. in the vicinity of the raw water inlet pipe), the "sampler" should be dropped to the desired depth as quickly as possible. The "sampler" should have sufficient weight to drop to depth quickly. Although the bottle will take in some water on the way down if the "sampler" is weighted sufficiently, the majority of water will come from the noted depth. In this case the narrow mouth (70-B-26) bottle is essential.

Ancillary Data

Chemical

It is recommended that basic chemical data be gathered at the same time as the asbestos sample is being taken.

The parameters of interest are:

Hardness (as $CaCO_3$)
Alkalinity (as $CaCO_3$)
pH
Colour (Hazen Units)
Turbidity (Ftu)
Conductivity (unhos/cm)
Total Solids
Chlorine Residual (free) (combined)
Temperature (^{o} C)

The data that is available at the water plant should be recorded and the date of the analysis recorded.

The temperature should be taken at the time of sampling but not in the sample bottle.

A sample (1000 ml- polyeythelene) should be collected in the same manner as the asbestos sample and submitted with it to the laboratory for chemical analysis. A sample submission is appended. The analyses required are:

Hardness (as $CaCO_3$)
Alkalinity (as $CaCO_3$)
pH
Colour (Hazen Units)
Turbidity (Ftu)
Conductivity (unhos/cm)
Total Solids.

Calcium
Manganese

It is important to have both the plant data and the lab. data to compare in case the asbestos sample was taken during unusual circumstances.

In terms of the understanding of a asbestos count, it is of paramount importance that ancillary data be available.

As the research on asbestos reduction through various modes of water treatment may require years to resolve, it is necessary to have all available ancillary data.

The chemical sample should be collected in the same manner as the asbestos sample and shipped with the chemical analyses sheet (appended) and the asbestos samples to the Laboratory.

Field Notes

Extensive field note sheets (appended) have been drawn up and tested on numerous samplings and subsequently revised. Although much information is requested, it has been found to all be necessary. Two sheets have been included, one for water treatment plants and one for distribution systems. On rare occasions when an environmental water sample is being taken, it is recommended to use the distribution system sample sheet. The field note sheet should be sent to the laboratory with the samples and will be returned with the completed analysis. Keeping of a duplicate sheet by the sampler in the field is also advisable.

Water Treatment Plant Sampling

In a water treatment plant it is necessary to sample both the raw and treated water if the water is subjected to any physical or chemical treatment. At the moment it is even advisable to collect both raw and treated samples if only chlorination and/or floridation are being carried out.

In order to sample the same "block" of water as it enters and leaves the water treatment plant it is necessary to take into account the retention time of the plant.

$$\text{RETENTION TIME} = \frac{\text{Plant Capacity}}{\text{Flow Rate}}$$

Sampling of the raw water is begun at a theoretical time 0 hrs. and ¼ bottle portions are taken at times 0, +5, +1.0 and 1.5 hrs. for the raw water. At times 0 + Retention time, 0.5 + Retention time etc. the treated water is sampled.

It is important to get the raw water prior to any treatment (ie. pre-chlorination). In some cases, this may be unavailable in the plant and the sampler must sample the supply source directly (ie. the lake or river in the vicinity of the inlet). It is likewise important to get the treated sample as it leaves the treatment process and not after it has been in the reservoir as this would negate the effect of taking the retention time into account.

Distribution System Sampling

A sample from a water distribution system should be collected in conjunction with a sample from the finished water leaving the water treatment plant. In this way, if asbestos is detected in the distribution system the amounts can be compared with the amount leaving the plant and the source identified.

No accurate method is available to insure the sampling of the same "block" of water as is available in the water plant. Common sense should prevail (ie. sample the plant first and the distribution system in the same general time period). Consultation with the utility operator will probably produce a good estimate.

Distribution system samples should be taken on a ¼ bottle portion every ½ hour as noted in the Water Treatment Plant Section.

The tap method of sampling is applicable to the distribution system. It is best to sample in a residence or other serviced buildings but care must be taken to insure that the water has not been subjected to some form of treatment within the building (ie. softener or filter system). Sampling at hydrants may at times be necessary but should be avoided if possible. When sampling at a hydrant dead end lines should be avoided and the hydrant should be flushed for at least 10 minutes at high volume before any sampling is commenced.

As with all types of asbestos samples, 2-1 litre polyeythelene bottles(1 for asbestos and 1 for chemistry)are to be collected for each asbestos analysis.

It is very important to fill out the Distribution System field sheet (appended) as completely as possible.

Environmental Sampling

On occasion when it is necessary to take open water samples, the sampler method outlined above should be used.

As with all types of asbestos samples 2 - 1 litre polyeythelene bottles (1 for asbestos and 1 for chemistry) are to be collected for each asbestos analysis.

It is recommended that the field note sheet for distribution system be used for environmental samples.

MOE T.N. 7017
(Water Plant)

ASBESTOS SAMPLE DATA

Municipality ______________________ Date ____________
Operator ______________________ Phone ____________
Address ______________________________________
Raw Water Source ______________________________

$$\frac{\text{Plant Capacity}}{\text{Flow Rate}} = \frac{\text{\_\_\_\_\_\_\_\_ MG}}{\text{MG hr}^{-1}} = \text{\_\_\_\_\_\_\_\_ Hours Retention Time.}$$

CHEMICAL TREATMENT

Unit Process	Chemicals Used	Dosage mg/ℓ	Location Used
Prechlorination			
Softening			
Alkalinity Adjustment			
Prime Coagulation			
Softening			
Coagulant Aid			
Post-Chlorination			
Post-pH Adjustment			
Fluoridation			

SCHEMATIC OF PLANT

SAMPLING

By ______________________
Location - Raw ______________________
- Treated ______________________
Methods Used ______________________________
Preservative Added ______________________________

Sampling Times

Raw 1-2-3-4-5-6-7-8-9-10-11-12-1-2-3-4-5-6-7-8-9-10-11-12
Treated 1-2-3-4-5-6-7-8-9-10-11-12-1-2-3-4-5-6-7-8-9-10-11-12

Notes ______________________________________

MOE T.N. 7017
(Water Plant)

ASBESTOS SAMPLE DATA

Date ____________________

Municipality ________________________ Plant ______________

CHEMICAL & PHYSICAL DATA

Date of Field Analysis ____________	Raw		Treated	
	Field	Lab	Field	Lab
Hardness (as $CaCO_3$)				
Alkalinity (as $CaCO_3$)				
pH				
Colour (Hazen Units)				
Turbidity (Ftu)				
Conductivity (unhos/cm)				
Total Solids				
Chlorine Residual (free)				
(combined)				
Temperature ($^{\circ}$ C)				

ASBESTOS DATA

Chrysotile		
fibres $\ell^{-1} \times 10^6$		
mass conc. $\mu g/\ell$		
Amphibole		
fibres $\ell^{-1} \times 10^6$		
mass conc. $\mu g/\ell$		
Other		
fibres $\ell^{-1} \times 10^6$		
mass conc. $\mu g/\ell$		

Date Filtered ________________________ By ________________

Date Counted ________________________ By ________________

Notes ____

MOE T.N. 7017
(Distribution System)

ASBESTOS SAMPLE DATA

Municipality ____________________ Date ______________
Operator ________________________ Phone _____________
Address ____

TESTING LOCATION

No. ____________ Type ______________________
Name _____________________________, Phone _____________
Address ____

Map

SUPPLY SYSTEM

	Length	Size	Type
1			
2			
3			
4			
5			

SAMPLING

By ______________________________ Date ______________
Method Used ______________________________________
Preservative Added ________________________________

Sampling Time

1-2-3-4-5-6-7-8-9-10-11-12-1-2-3-4-5-6-7-8-9-10-11-12 (Plant)
1-2-3-4-5-6-7-8-9-10-11-12-1-2-3-4-5-6-7-8-9-10-11-12 (Dist. Sy.)

Notes ____
____

MOE T.N. 7017
(Distribution System)

ASBESTOS SAMPLE DATA

Date ____________________

Municipality ____________________ Location No.____________________

CHEMICAL & PHYSICAL DATA

Date of Field Analysis ____________	Plant Eff.		Distribution Pt.	
	Field	Lab	Field	Lab
Hardness (as $CaCO_3$)	______	______	______	______
Alkalinity (as $CaCO_3$)	______	______	______	______
pH	______	______	______	______
Colour (Hazen Units)	______	______	______	______
Turbidity (Ftu)	______	______	______	______
Conductivity (unhos/cm)	______	______	______	______
Total Solids	______	______	______	______
Chlorine Residual (free)	______		______	
(combined)	______		______	
Temperature ($^\circ$ C)	______		______	

ASBESTOS DATA

Chrysotile		
fibres $\ell^{-1} \times 10^6$	________	________
mass conc. $\mu g/\ell$	________	________
Amphibole		
fibres $\ell^{-1} \times 10^6$	________	________
mass conc. $\mu g/\ell$	________	________
Other		
fibres $\ell^{-1} \times 10^6$	________	________
mass conc. $\mu g/\ell$	________	________

Date Filtered ____________________ By ____________________

Date Counted ____________________ By ____________________

Notes ____

____

____

MAIL ADDRESS
MINISTRY OF THE ENVIRONMENT
LABORATORY BRANCH
P.O. BOX No. 213
REXDALE, ONTARIO

MINISTRY OF THE ENVIRONMENT

LABORATORIES

EXPRESS ADDRESS:
RESOURCES ROAD
HIGHWAY 401 & ISLINGTON AVE.
TORONTO, ONTARIO

Municipality:
Source: Region:
Program: Ancillary Asbestos Data
Date sampled: by:
Date analysed: Date reported:

Report to: "Asbestos Data Bank"
Address: c/o R. Hunsinger - Water Technology

C	
Bi	
Ba	

LAB. NUMBER	SENDER'S NUMBER	SAMPLING POINT LOCATIONS AND TIME	NATURE OF SAMPLE, DANGEROUS CONSTITUENTS, PRESERVATIVES USED, COMPOSITING DATA, ETC.	✓CHECK BELOW IF CHLORINE PRESENT

LAB. NUMBER	Hardness as $CaCO_3$	Alkalinity as $CaCO_3$	pH	Colour	Turbidity in F.T.U.	Conductivity μmhos/cm	Total Solids	Ca	Mg		

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